

# QUEST

ADVENTURES IN THE WORLD OF SCIENCE

## BRAIN POWER

**14****MODEL:****BRAIN TEASER****FACT FILES ON:**

- ▶ Mind and body
- ▶ Mental chemistry
- ▶ Processing information
- ▶ Machines with minds
- ▶ Brainwashing techniques
- ▶ Intelligence and I.Q.
- ▶ Mind over matter

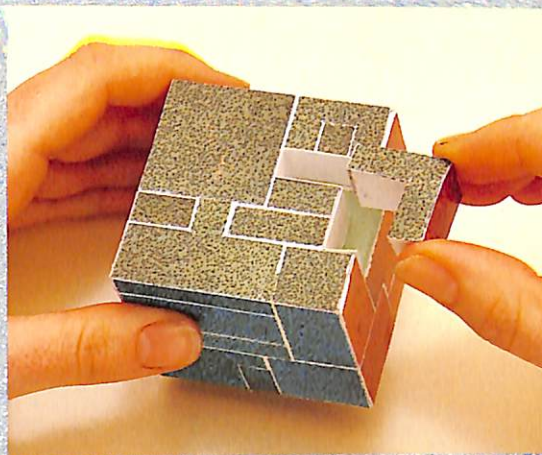
**PLUS****SECRETS OF SLEEP  
POSTER****THREE PROJECTS**



# INSIDE THIS PACK

## FACT FILES

Electrical impulses  
Creative thinking  
Brainwaves  
Clever creatures  
Chemical imbalances  
Child prodigies  
The paranormal



**MODEL** Brain teaser



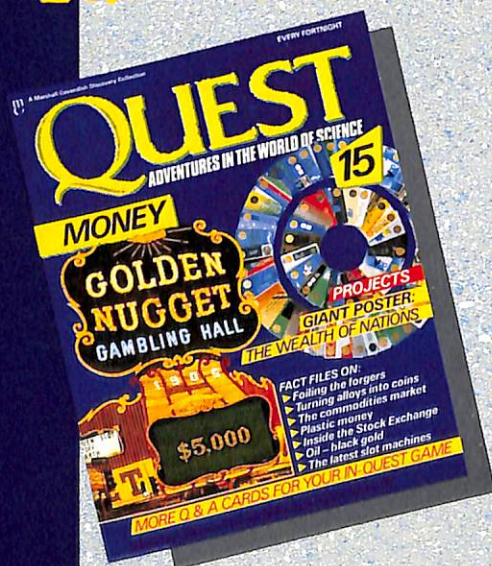
**POSTER** Secrets of sleep

## PROJECTS

- Solve a loopy puzzle
- Test your powers of recall
- Try lateral thinking

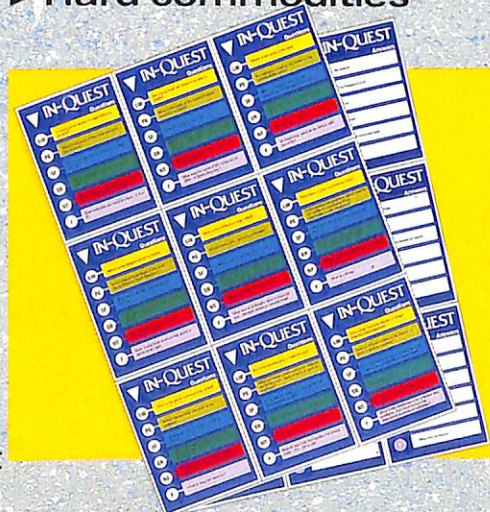


# COMING IN QUEST 15 MONEY



## FACT FILES include:

- Modern minting
- Oil – black gold
- Smart money
- Hi-tech selling
- Hard commodities



**POSTER**  
The wealth of nations

## PLUS

In-Quest question and answer cards and your DataQuest update

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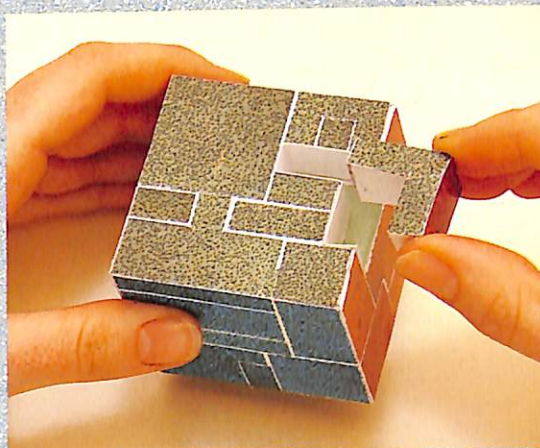
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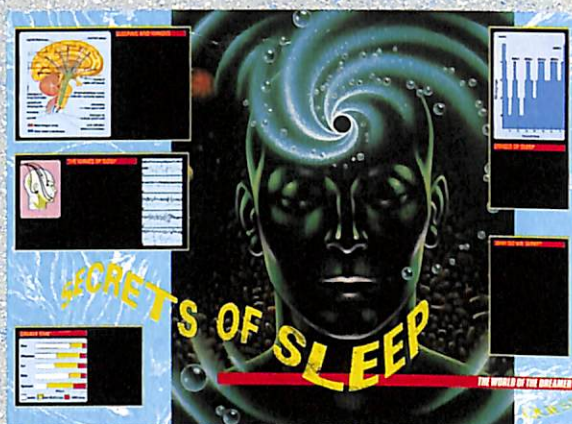
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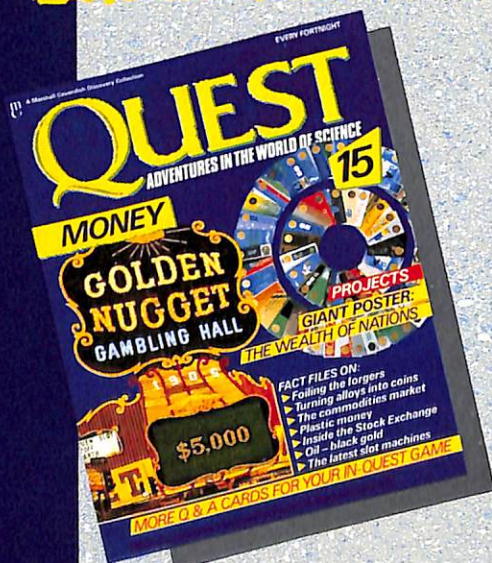
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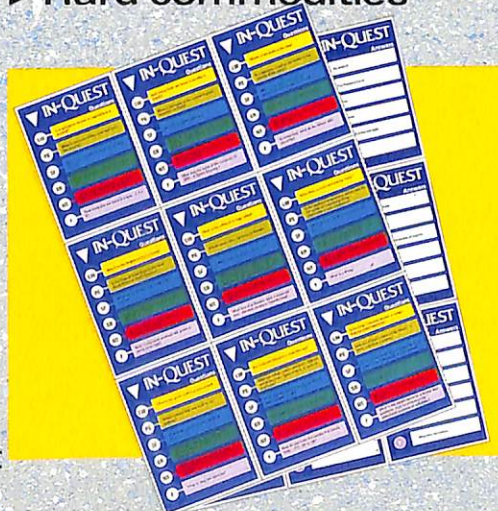


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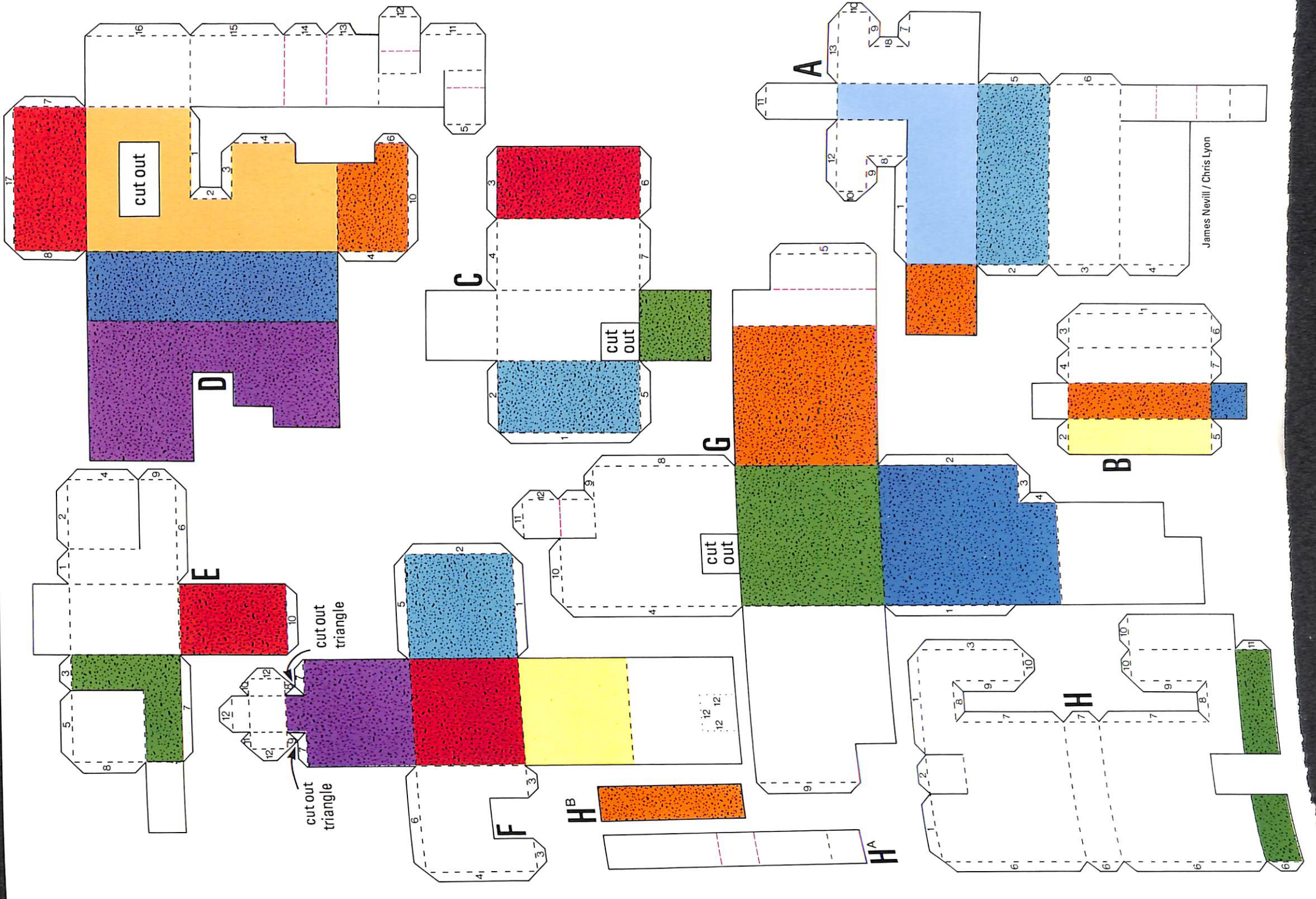
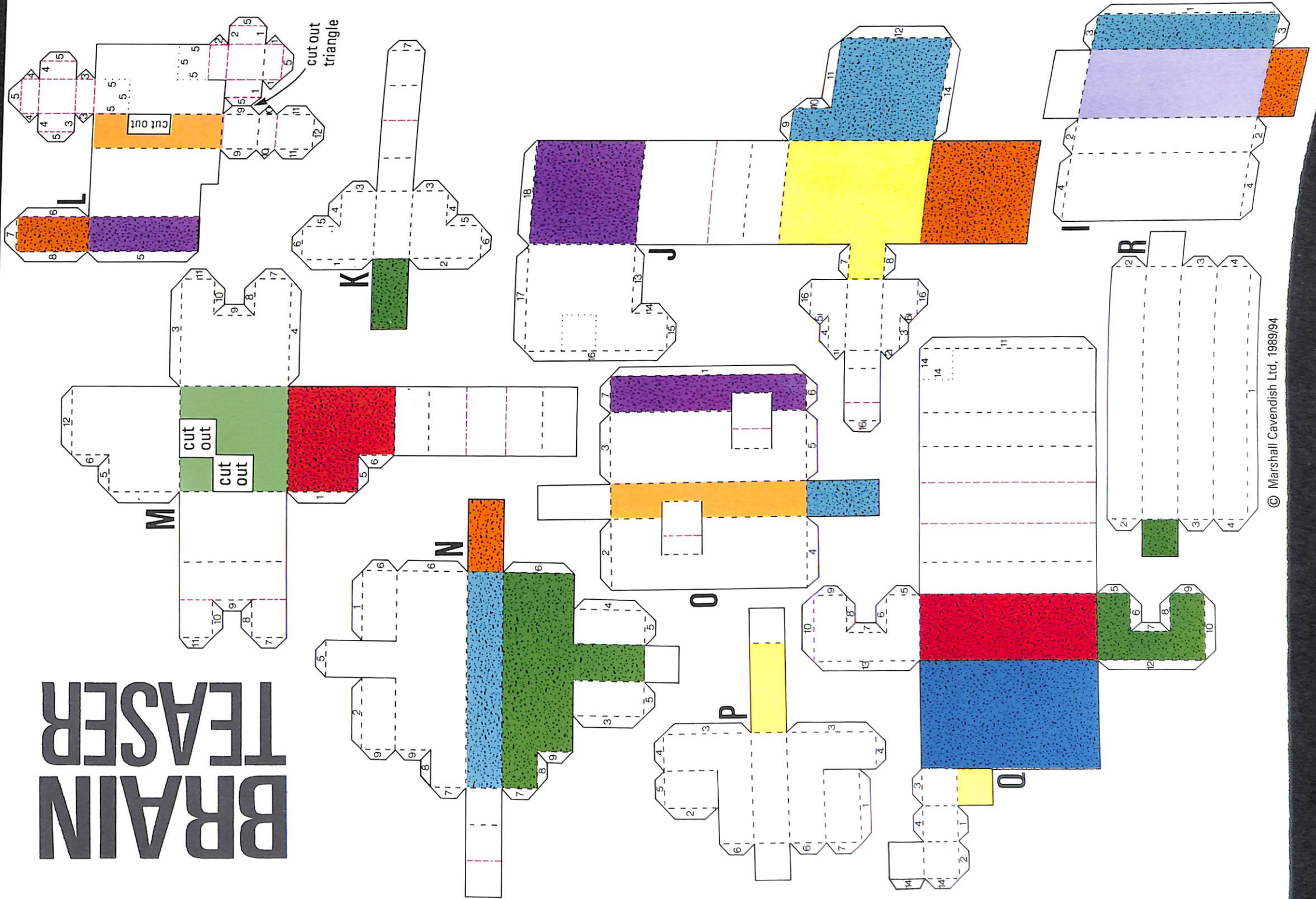
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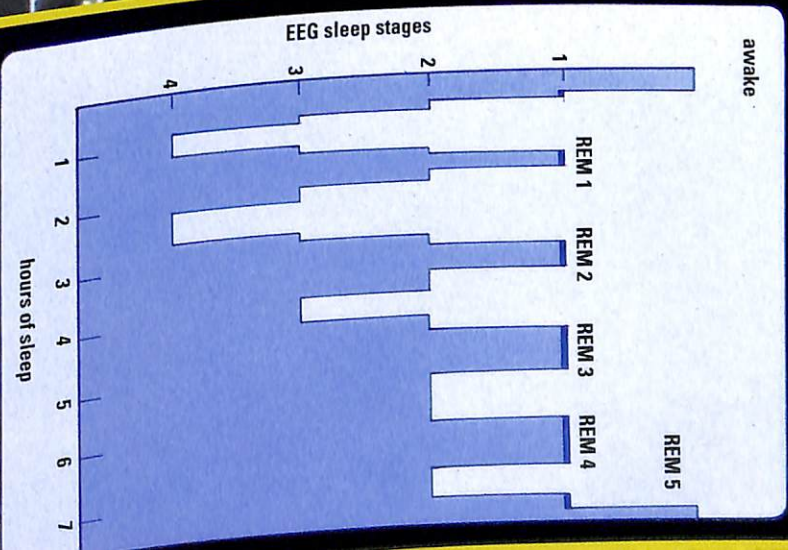


# BRAIN TEASER



James Nevill / Chris Lyon





## STAGES OF SLEEP

Four stages of sleep, apart from REM sleep, have been identified, according to the brain waves and eye movements that occur during them. A young adult sinks through successively deeper levels during the first minutes or so of sleep. Then a burst of sleep begins, during which the brainwaves resemble those of very light sleep. After the sleeper again passes through the deeper stages. This cycle repeats itself several times, except that the deepest stages do reappear towards the end of the night.

## WHY DO WE SLEEP?

Nearly all the 'higher' animals (animals with backbones) sleep – but no one is sure why. Some scientists have suggested that the purpose of sleep is merely to keep the animal out of danger, using minimal energy at times when it does not need to feed, hunt or otherwise be active. However, many scientists think the time is used by the brain to organize information.

We know even less about the purpose of dreaming. The study of dreams was revolutionized when rapid eye movement (REM) sleep was discovered. During REM sleep the eyeballs move rapidly, even though the rest of the body is deeply relaxed. A person roused from REM sleep usually reports a vivid dream. Woken from other types of sleep, he or she is far less likely to do so.

People suffer if they are deprived of sleep – their ability to concentrate decreases and they may even begin to hallucinate. If deprived specifically of either REM or non-REM sleep, they will compensate by having more of the same kind of sleep later.

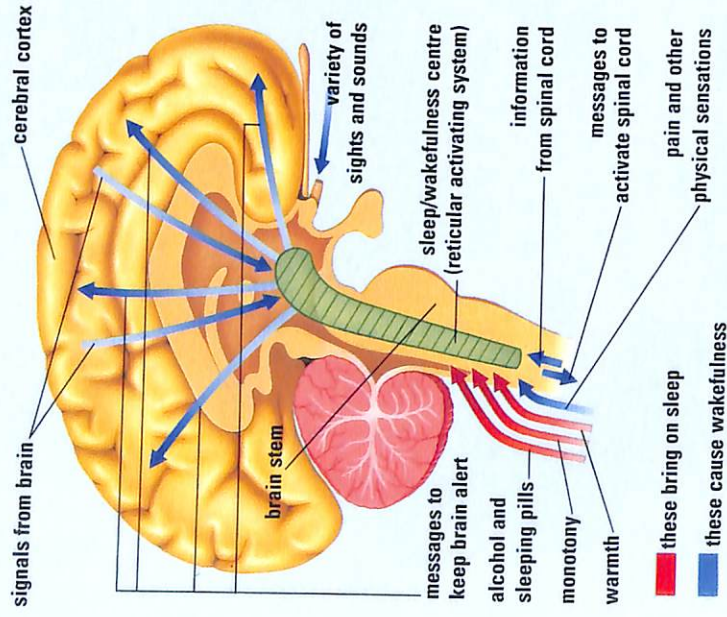
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# WORLD OF THE DREAM

## THE WORLD OF THE DREAM

QUESTIONS





## SLEEPING AND WAKING

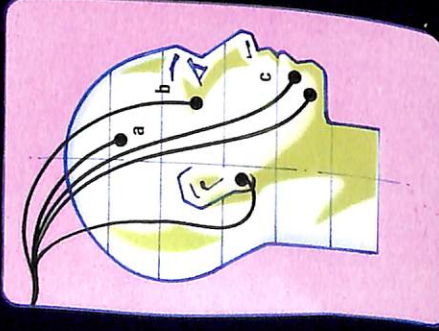
Both sleep and wakefulness are initiated by activity in the reticular activating system (RAS). This lies within the brain stem, which links the brain to the spinal cord. When a person is alert, a stream of signals passes from the RAS to the cerebral cortex, the deeply folded outer layer of the brain.

The electrical activity of the cortex is responsible for conscious mental processes. The signals from the RAS carry information that has come from the eyes and ears or, via the spinal cord, from the other sense organs. The RAS also receives signals from the cortex, such as worrying thoughts – these, too, can cause the RAS to keep you awake.

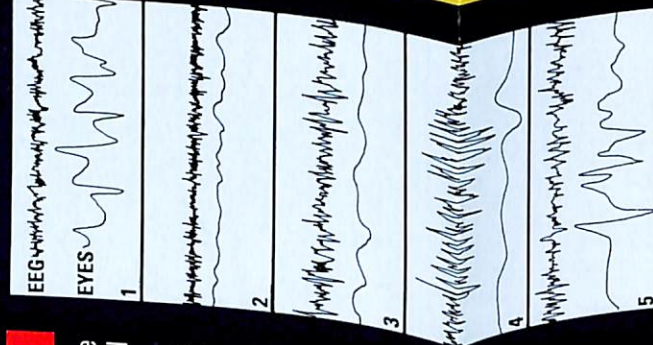
The RAS is just as active in causing sleep. Sleep may be prompted by the time of day, perhaps because chemicals have accumulated in the body. Outside factors – monotonous surroundings, for example – can also bring on sleep. The RAS sends signals to the cortex that trigger the patterns of activity characteristic of sleep.

## THE WAVES OF SLEEP

- 1 When a person is awake, the eyes make large movements and the EEG shows small and fast-changing brainwaves.
- 2 When a person is relaxed, with eyes closed, but still awake, the 'alpha rhythm' appears: brainwaves are regular and occur at a rate of about ten per second.
- 3 In light sleep brainwaves become larger and slower; the eyes roll slowly, though the eyelids remain closed.
- 4 In deeper stages of sleep, large, slow 'delta' waves appear; eye movements are still few and slow.
- 5 During REM sleep brainwaves become shallow and irregular again, resembling those of the waking state. The eyes jerk rapidly back and forth. The sleeper is hard to rouse but, if woken, he or she is likely to recall having a vivid dream.



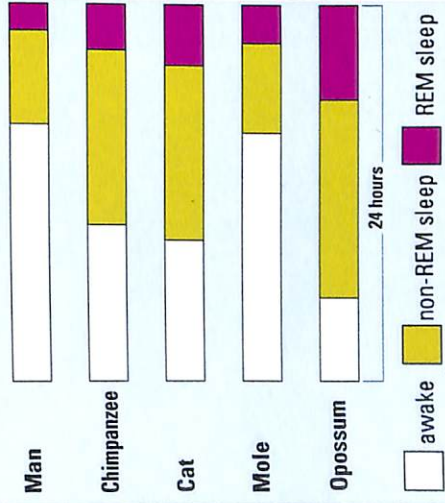
Electroencephalograms, or EEGs, are recordings of electrical brainwaves made by electrodes attached to the head: **a** brain activity; **b** eye movements; **c** chin movements.



## DREAM TIME

Sleep takes up much of the lives of both animals and human beings – lions can spend 20 hours per day sleeping or resting and opossums 'play possum' for 19 hours a day. In mammals – animals that suckle their young – part of this time is spent in REM (rapid eye movement) sleep. In human beings REM sleep is associated with dreaming.

During REM sleep body muscles are paralysed – so when a dog twitches or growls in its sleep, it is probably *not* dreaming.







# PROJECTS

## BRAIN POWER

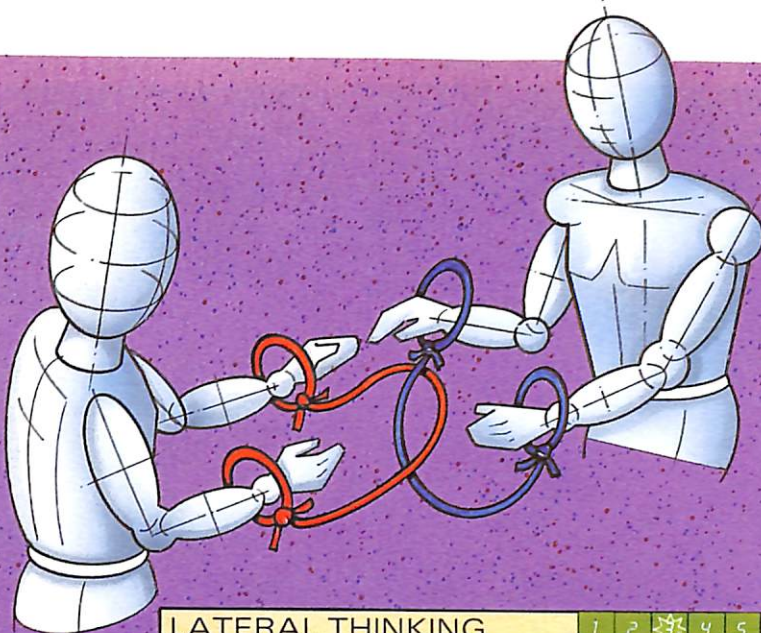
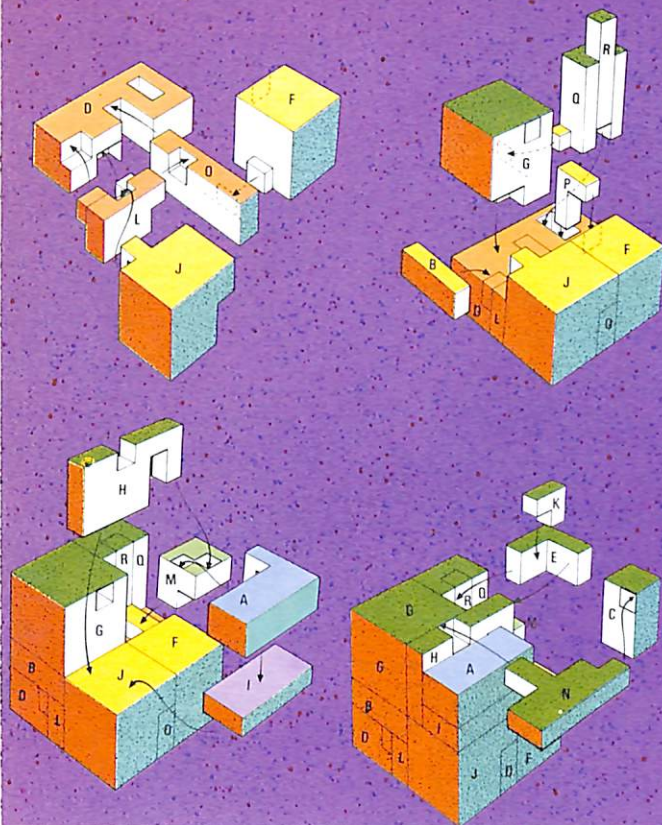
- How good are you at solving problems?
- Discover how unconventional you are in the way you think
- Test your powers of recall

### A LOOPY PUZZLE 1 2 3 4 5

People good at arithmetical problems are not always so good at practical puzzles. This one involves the branch of geometry known as topology. It deals with the connections between objects, rather than with their shapes or sizes. Try this with a friend and see if you can separate yourselves without cutting the string, untying the knots or slipping your hands from the loops.

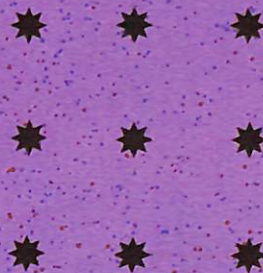
Take a piece of string and tie the ends around a friend's wrists. Pass another piece of string around the first piece, then get your friend to tie the ends around your own wrists. The strings will now link you together. It may look impossible, but try to find a way of unlinking the strings. If you have difficulty, it may help to consider how the linkage between the loops differs from that of a chain. The solution is given overleaf.

### BRAIN TEASER – Solution



### LATERAL THINKING 1 2 3 4 5

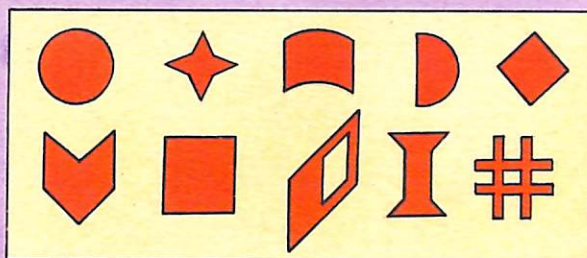
Find out how creative you are. The faster you can resolve the puzzle, the more inventive your mind.



If you don't want to mark your project sheet, copy the above pattern on to a piece of paper. Join the stars together using only four straight lines, without removing the pencil from the paper and without retracing any line. Clue: don't think of the stars as a square. The solution is given overleaf.

### VISUAL MEMORY 1 2 3 4 5

Some people have a photographic memory and are good at remembering anything they see. Find out how good you are at recalling these shapes.



Study the shapes above for about one minute. Next, cover them up and see how many you can draw on a separate sheet of paper. If you scored four or less, try again, this time associating the shapes with objects, such as a cotton reel or army badge.

Each **QUEST** project has been given its own difficulty rating: 1 very simple 2 simple 3 intermediate 4 advanced 5 complicated.



**WARNING!**

Every care has been taken to ensure projects are as safe as possible. However, parents should supervise all projects. The publisher can accept no liability for any injury.